# Utilizing AMS Data and PMF Analysis to Assess Regional Simulations of POA from Anthropogenic and Biomass Burning Sources

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And thanks to many others!
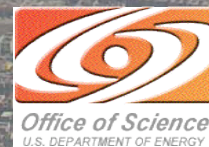
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Motivation

- Large **underprediction** in organic aerosol mass contributes to uncertainties in both direct and indirect radiative forcing produced by climate models

- SOA processes are **poorly understood & parameterized** in models, but is POA predicted reasonably well?
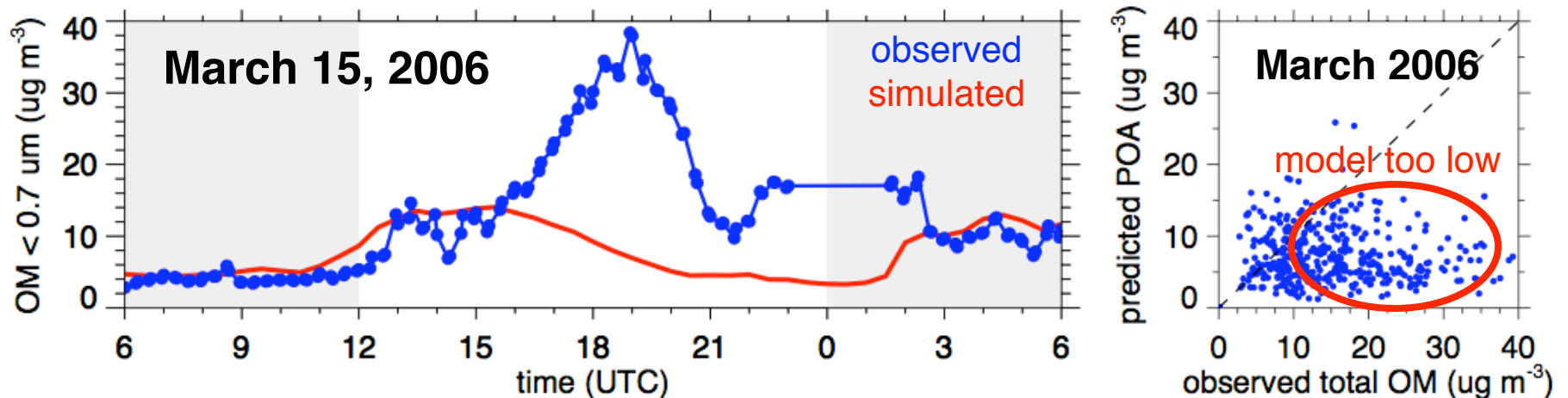

- Use extensive MILAGRO data to evaluate regional 3-D simulations of POA over and downwind of Mexico City

- If POA predicted "well", then use simulation as a benchmark to test new SOA treatments

Approach

WRF-chem: CBM-Z (photochemistry) coupled with MOSAIC (aerosols)

Emissions: 1999 NEI & 2002 MCMA Inventories + Biomass Burning

→ CO, BC, and other parameters assessed along with OM
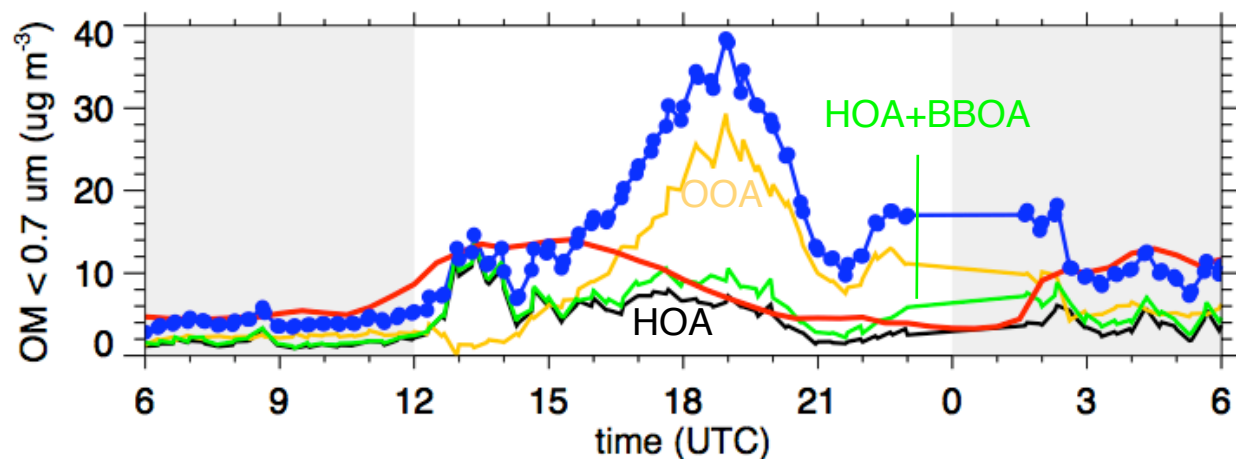

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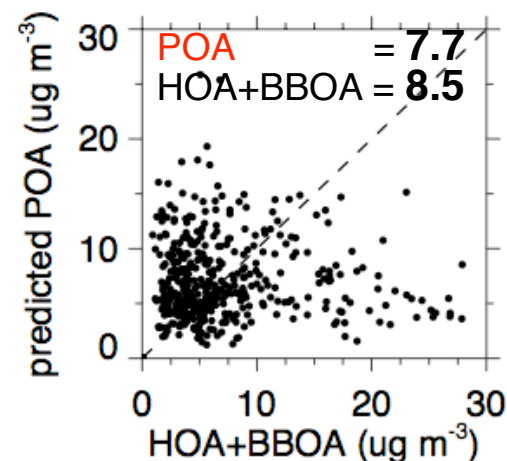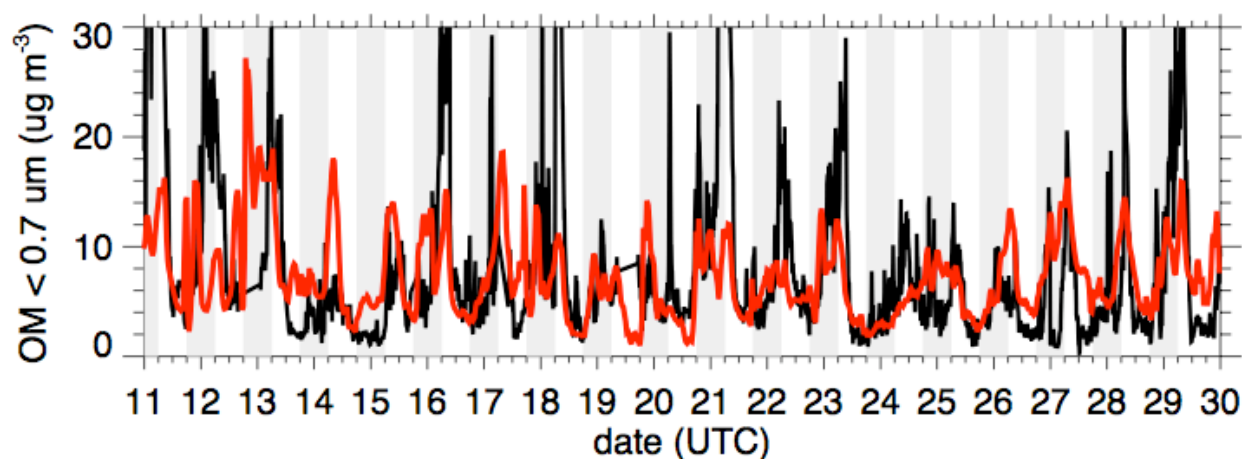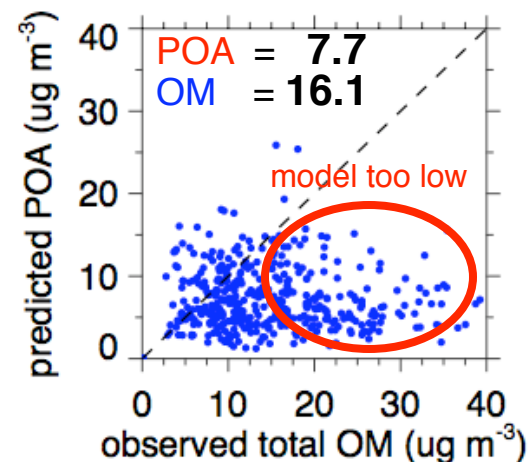*operational*
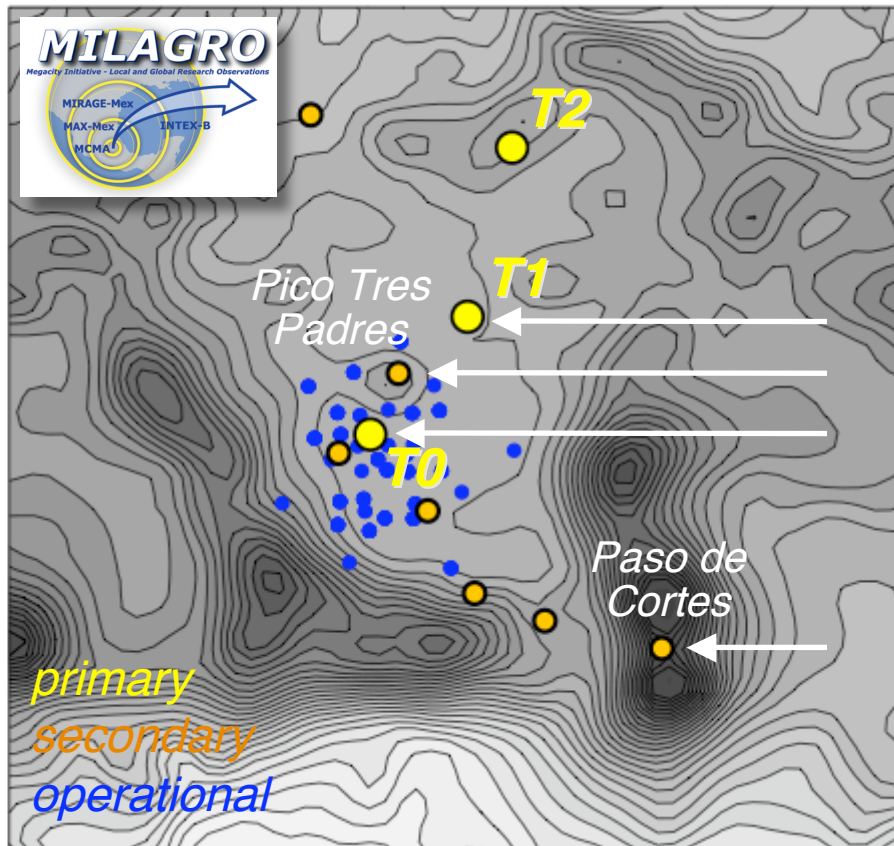
Aerosol Mass Spectrometer

- *4 surface sites and on 2 aircraft (G-1 & C-130)*
- *Organic components (HOA, BBOA, OOA) available via PMF analysis*
- *Unprecedented data set to evaluate details of models*

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PMF Components and Predicted POA

Organic Matter at T0 on March 15

March 11 - 30

- Diurnal variation and magnitude of simulated POA closer to HOA+BBOA

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What About at Other Sites?

Diurnal Average
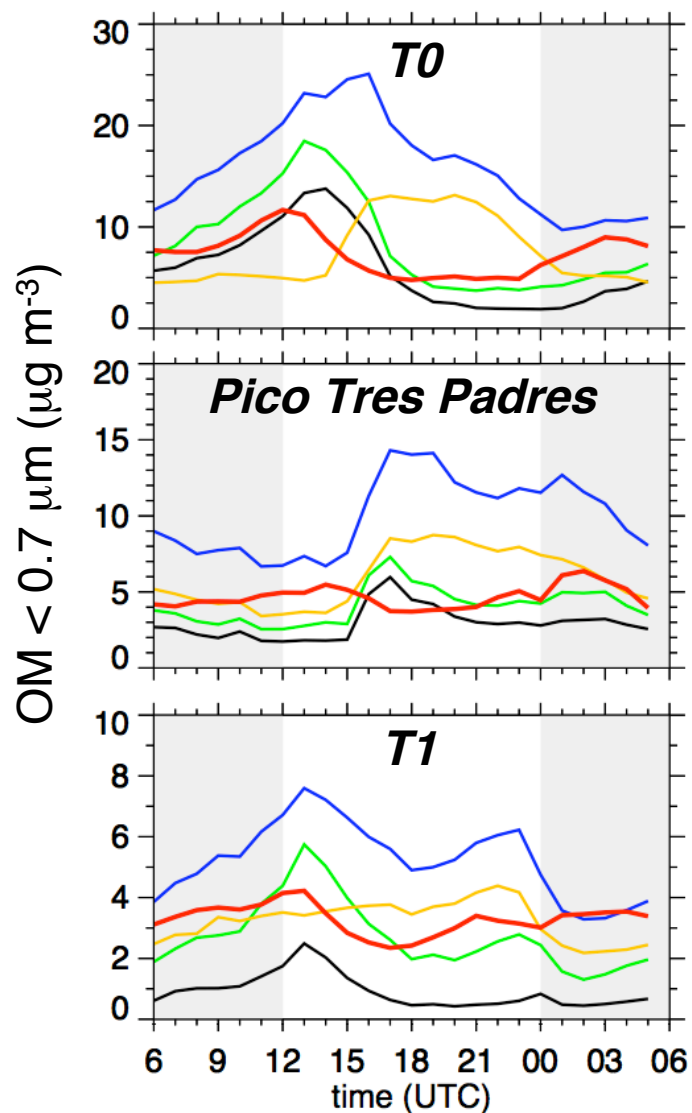
Percentiles over 19 Days
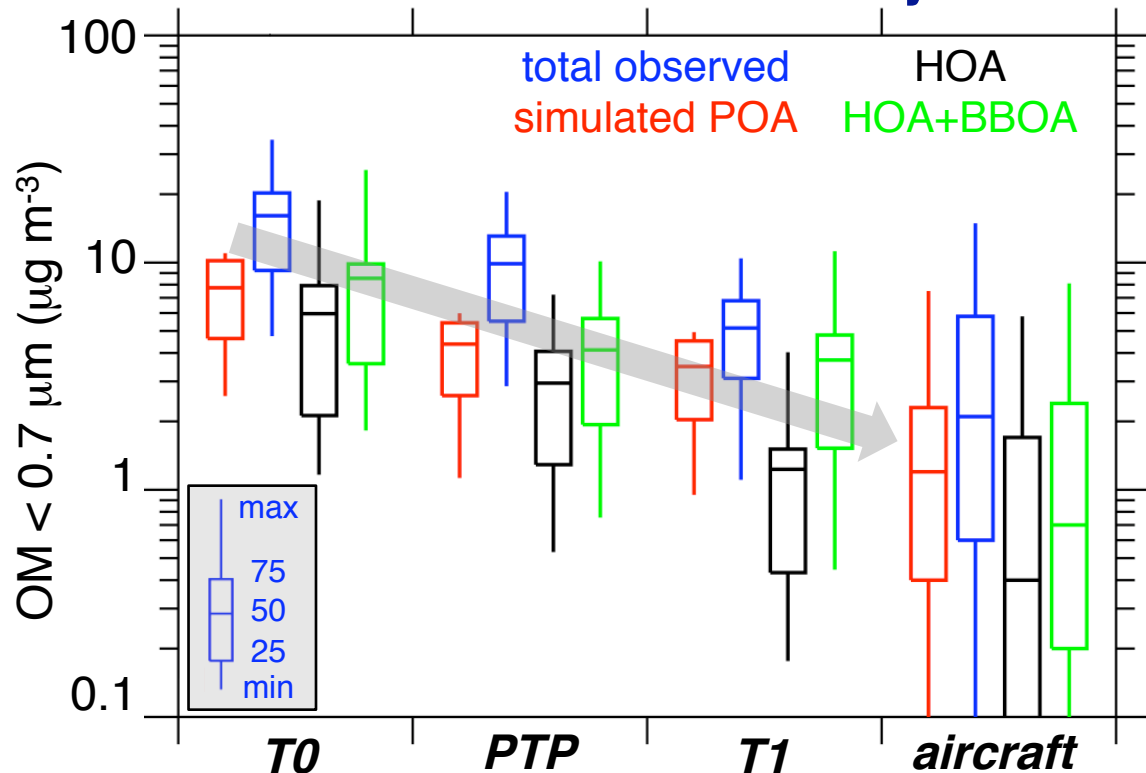
- Median and range of simulated POA closer to HOA+BBOA … but,
- Diurnal variation of POA predicted reasonably well only in the city

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Discussion

- Conclusions:
  - Median simulated POA within 7 – 37% of median HOA+BBOA
  - NEI inventories of CO/BC and CO/POA should be more like MCMA
  - POA emissions for large fires too high – missing small fire sources
  - TOOC at T1 suggests VOC emissions too high by 10 – 50%
- Uncertainties:
  - ***Collection efficiency*** of 0.5 (20 - 25%)
  - ***PMF separation*** via low and high resolution AMS data (5 – 10%)
  - If POA ***semi-volatile***, then emissions too low [*Huffman et al.*, 2008]
- Next Steps: Testing SOA Treatments
  - Volatility of POA
  - Simple treatments for SOA, i.e. yields [*Herndon et al.,* GRL, 2008]
  - Complex treatments for SOA [*ASP collaborators*]

- For more details: see on-line paper in ACPD